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| OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | | |
| EXAMINER | | | | |
| LIEW, ALEX KOK SOON | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary**Application No.**

10/720,136

Applicant(s)

ISOMURA ET AL.

Examiner

ALEX LIEW

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 8-11 and 16-22 is/are rejected.
- 7) ☒ Claim(s) 5-7 and 12-15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

The amendment filed on 1/3/08 is entered and made of record.

Response to Applicant's Arguments

The applicant argued on pages 11 and 12 that Specht and Alumot do not disclose the amended claim 1 and 11 limitations:

"...a repeated pattern area detector which detects whether candidates for the plurality of repeated pattern areas exist in the second detected pattern data by performing rough search of the second detected pattern data, and which measures area sizes of the candidates if the candidates exist; ... " and

"...a repeated pattern area detector which generates image data of an entire region of the pattern from the design pattern data with a pixel size corresponding to a first optical magnification lower than an optical magnification of the first imaging optics, and detects whether candidates for the plurality of repeated pattern areas exist in the design pattern data by performing rough search of the second detected pattern data, and which measures area sizes of the candidates if the candidates exist; ... ," respectively.

The examiner does not entirely agree with the applicant. Alumot discloses a repeated pattern area detector which detects whether candidates for the plurality of repeated pattern areas exist in the second detected pattern data by performing rough search of the second detected pattern data (see column 5, lines 24 to 39, the first phase process of Alumot performs a rough to detect defect on the wafer), but does not disclose

measuring the areas size of the candidates if the candidate exist. In an updated search, the examiner found Floeder (US pat no 6,950,547); Floeder discloses measuring the areas size of the candidates if the candidate exist (see column 13, lines 44 to 51). One skilled in the art would include step of measuring the area of a potential defect because make further classify the type of defect, to let the operator know which operation in needed to correct the defect, improving the quality of the wafer. Floeder is combinable with Specht and Alumot because all references are based on inspection of product using image analysis.

The examiner will make rejections based on new found reference Floeder.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 19 recites the limitation "patterns from the same file" in line 11. There is insufficient antecedent basis for this limitation in the claim. The "file" in claim 19 was not clearly defined as to where it came from or where it is store or what is contained in the "file".

DETAILED ACTION

Claim Objections

Claims 5 – 7 and 12 – 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With regards to claim 5, the examiner cannot find any applicable prior art and / or suggestions disclosing *re-acquires* image data of the pattern with a second optical magnification higher than the first optical magnification within the detected area sizes, judges a coincidence degree of the candidates on the basis of the re-acquire image data, and registers the candidates, when judged to coincide, as the plurality of repeated pattern areas in combination with all the limitations of claim 1.

With regards to claim 12, see the rationale for claim 5.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Specht (US pat no 4,805,123).

With regards to claim 19, A pattern inspection apparatus which perform die-to-die inspection of comparing detected pattern data of one area with detected pattern data of another area among a plurality of repeated pattern areas (see figure 1, elements 18, 20 and 44, shows a die to die inspection system), and die-to-database inspection of comparing the detected pattern data with reference pattern data obtained from design pattern data (see column 7, lines 22 to 25), comprising:

- imaging optics which form an optical image of a pattern formed on an inspection target plate on the basis of the design pattern data (see figure 1, elements 18 and 20);

- a detected pattern data generator which detects the optical image and generates the detected pattern data (see column 5 lines 16 to 21, the input data from the wafer gets converted into image pixel data);

- a repeated pattern area detector which analyzes layout information of the design pattern data as to whether patterns from the same file exist and detects the plurality of repeated pattern areas from the design pattern data (comparing patterns, patterns that are identical to each other; for example performing die-to-die comparison on an area of pattern in the wafer image on two separate dies, reads on 'repeated pattern detector' because the imaging systems are looking for same repeated patterns; ff the dies are not the same then there is a potential defect in one or both of the dies, but if both die

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patterns are the same then it is concluded that there is no defects in both of the examined die images); and

a comparator which sequentially compares a plurality of detected pattern areas on the second detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated pattern area detector in accordance with die-to-die comparison (see figure 1, elements 38 and 44 and discussion for previous limitation).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 – 4, 8 – 11 and 16 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Specht (US pat no 4,805,123) in view of Alumot (US pat no 5,699,447) and Floeder (US pat no 6,950,547).

With regards to claim 1, Specht discloses a pattern inspection apparatus, which performs die-to-die inspection of comparing detected pattern data of one area with detected pattern data of another area among a plurality of repeated pattern areas (see fig 1 – 10), comprising

first imaging optics which forms first optical image of a pattern formed on an inspection target plate on the basis of design pattern data (see figure 1, element 18);

a detected pattern data generator which detects the first optical image and generates first detected pattern data (see column 5 lines 16 to 21, the input data from the wafer gets converted into image pixel data);

second imaging optics which forms second optical image of a pattern formed on an inspection target plate on the basis of design pattern data (see figure 1, element 20);

a detected pattern data generator which detects the second optical image and generates second detected pattern data (again see column 5, lines 16 to 21);

a repeated pattern area detector which detects the plurality of repeated pattern areas from the second detected pattern data (comparing patterns, patterns that are identical to each other; for example performing die-to-die comparison on an area of pattern in the wafer image on two separate dies, reads on 'repeated pattern detector' because the imaging systems are looking for same repeated patterns; ff the dies are not the same then there is a potential defect in one or both of the dies, but if both die patterns are the same then it is concluded that there is no defects in both of the examined die images); and

a comparator which sequentially compares the first and second input data of the repeated pattern areas to perform die-to-die comparison (see figure 10, the input data from the left and right die are compared with each other and defects are detected using image difference).

Specht does not using the second imaging means to capture the image of the entire wafer and detects repeating patterns from the image obtained from the second imaging means. Alumot discloses a complete surface of the wafer is inspected at a lower spatial

resolution, so information is outputted indicating suspected locations on the wafer having high probability of a defect (see column 5, lines 24 to 27 and lines 37 to 39), which reads on limitations 'second imaging optics which forms second optical image of the pattern, the second imaging optics serving to scan an entire region of the pattern on the inspection target plate with an optical magnification lower than that of the first imaging optics' and 'a low-resolution image data generator which generates second detected pattern data corresponding to the entire region of the pattern on the inspection target plate using a second optical image.' Alumot also discloses a repeated pattern area detector which detects whether candidates for the plurality of repeated pattern areas exist in the second detected pattern data by performing rough search of the second detected pattern data (see column 5, lines 24 to 39, the first phase process of Alumot performs a rough to detect defect on the wafer). One skilled in the art would include imaging entire pattern region means and detect repeated pattern means because those repeated patterns are most likely ones that have defects in them and detecting the repeated patterns will locate the defect in the wafer and improve inspection process.

Specht and Alumot do not disclose measuring the areas size of the candidates if the candidate exists. Floeder discloses measuring the areas size of the candidates if the candidate exists (see column 13, lines 44 to 51). One skilled in the art would include step of measuring the area of a potential defect because make further classify the type of defect, to let the operator know which operation is needed to correct the defect,

improving the quality of the wafer. Floeder is combinable with Specht and Alumot because all references are based on inspection of product using image analysis.

With regards to claim 2, Specht discloses an apparatus according to claim 1, wherein the repeated pattern area detector detects the plurality of repeated pattern areas by pattern matching on the basis of a similarity on a pattern layout of the second detected pattern data (see fig 10 – the left image is matched with the right image to find defects).

With regards to claim 3, Specht discloses an apparatus according to claim 2, wherein the similarity in the pattern includes a pitch and size of the plurality of repeated pattern areas (see fig 10 – the pitch of the left and right images is 4 pixels and the size of the left and right images are 2 X 2).

With regards to claim 4, Specht discloses an apparatus according to claim 1, wherein the repeated pattern area detector further performs detection of the plurality of repeated pattern areas on the basis of the design pattern data (see figure 10 – the design of those left and right images are to have a dark pixels in the upper left corner of the image window).

With regards to claim 8, an extension to the rejection of claim 1, Alumot discloses those repeated patterns having square shapes (see figure 9, the vertical length of each die is longer than the horizontal length). Whether detecting square, rectangular or any other

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generic shapes, it is just a matter of design as to how the dies are manufactured and does not change the image processing steps of the system. One skill in the art would include a rectangular shape die because it can be easily manufacture, which takes less time to send to the market.

With regards to claim 9, an extension to the rejection of claim 8, the size of the die does not change the image processing steps needed to inspect the dies, and semiconductor electronic of various sizes are well known (MPEP 2144.03). One skill in the art would choose a size of 1 mm square or less because to manufacture more chips with lesser which improve productivity and profit gain.

With regards to claims 10 and 11, see the rationale and rejection for claim 1.

With regards to claim 16, see the rationale and rejection for claim 8.

With regards to claim 17, see the rationale and rejection for claim 9.

With regards to claim 18, see the rationale and rejection for claim 10.

3. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Specht ('123) in view of Alumot ('447).

With regards to claim 22, see the rationale and rejection for claim 1.

4. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Specht (US pat no 4,805,123) in view of official notice (MPEP 2144.03).

With regards to claim 20, an extension to the discussions in the rejection for claim 19, whether detecting square, rectangular or any other generic shapes, it is just a matter of design as to how the dies are manufactured and does not change the image processing steps of the system. One skill in the art would include a rectangular shape die because it can be easily manufactured, which takes less time to send to the market.

With regards to claim 21, an extension to the rejection of claim 20, the size of the die does not change the image processing steps needed to inspect the dies, and semiconductor electronics of various sizes are well known (MPEP 2144.03). One skill in the art would choose a size of 1 mm square or less because to manufacture more chips with lesser which improve productivity and profit gain.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX LIEW whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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3/14/08